State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Northern District

RECREATION USE SURVEY OF INDIAN CREEK, PLUMAS COUNTY 1980

Technical Information Report No. 81-1

Prepared under the supervision of
Ralph N. Hinton, Chief, Recreation Section

by

Sharon L. Haines, Graduate Student Assistant

This report was prepared to summarize information collected under WO 1600-4268 as part of an evaluation of a proposed reoperation of Antelope Reservoir, an element of the Department's Instream Water Use Program. Although this report was reviewed by appropriate individuals in the Department and other agencies, it is intended for internal use and should be considered preliminary and subject to revision.

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SUMMARY

A survey of streamside recreation was made along Indian Creek, Plumas County, in 1980. This was the last year of a three-year program to estimate the amount and types of recreation with increased flow releases. The random sample survey was taken along distinct stream reaches and during different use periods. Use counts were combined with interviews of recreationists to gather information on activity, length of stay, visitor origin, and other data. A concurrent creel census determined angler success.

An estimated 75,000 hours of recreation use (42,000 recreation days) were spent on Indian Creek between April 26 and November 15, 1980. The most frequently observed activities were camping, fishing, swimming and/or beach use, and relaxing. Seventy-one percent of the fishing occurred on the first 18 km (11 miles) of stream below Antelope Dam. Thirty-five percent of the visitors lived in Plumas County, 54 percent said Indian Creek was their primary destination, and 47 percent stayed overnight in the area. Results from the use counts were similar to data obtained from 781 parties interviewed.

Anglers caught 3,050 brown trout (Salmo trutta), 3,580 rainbow trout (Salmo gairdneri), and 390 fish of other species in 12,300 hours of fishing. About 400 crayfish (Pacifastacus leniusculus) were also taken in 100 hours of crayfishing. Eighty-seven percent of the trout were caught in the first 18 km (11 miles) below Antelope Dam.

INTRODUCTION

The Northern District, Department of Water Resources (DWR), conducted a recreation survey and creel census on Indian Creek, Plumas County, from April 26 to November 15, 1980. This was the last year of a three-year study to determine the influence of augmented flow releases on streamside recreation.

Indian Creek below Antelope Dam offers an opportunity to implement the DWR water management policy, adopted in 1975, which states, "Instream uses for recreation, fish, wildlife, and related purposes shall be balanced with other (water) uses." When Antelope Dam began operation in 1964, streamflows in Indian Creek below the dam were stabilized. Minimum flows were increased from about 0.08 m^3/s (3 ft^3/s) to 0.28 m^3/s (10 ft^3/s) with an apparent five-fold increase in trout populations (Gerstung, 1973). Presumably, fishing and related recreation on the creek were likewise enhanced. Increasing the flow to 0.57 m^3/s (20 ft^3/s) would result in an additional doubling of trout habitat (DWR, 1979).

On a trial basis, Antelope Reservoir was reoperated in March 1978 to increase flows in the creek in an effort to enhance recreation and fishery values without significant detriment to lake recreation. Streamflow releases were maintained at 0.57 m^3/s (20 ft^3/s) during 1978 and the effects on recreation were monitored (Cartier, 1979).

Severe drought conditions in northeastern California during water year 1978-79 (runoff at Antelope Dam was 35 percent of normal) caused the release to be reduced to 0.28 m^3/s (10 ft^3/s) in January 1979. This was done to assure filling of Antelope Reservoir and to avoid the possibility of an even lower release that summer. The release from Antelope Reservoir was maintained at 0.28 m^3/s (10 ft^3/s) during the 1979 study period and the effects of this schedule on recreation were monitored (Haines, 1980).

Heavy rainfall in mid-January 1980 filled Antelope Reservoir and began a lengthy period of spill which ended on July 10. The release from the reservoir was maintained at 0.57 m^3/s (20 ft^3/s) the remainder of the year and the effects on recreation were monitored for the third year.

DESCRIPTION OF STUDY AREA

Indian Creek is a major tributary of the East Branch of the North Fork Feather River in Plumas County. This scenic area was once occupied by Maidu Indians. It has a rich history of gold mining, ranching, and lumber production. In recent decades, recreation use has increased rapidly with water as a major attraction. Employment today is divided among services, government, logging, and lumber manufacturing. Ranches operate in Indian and Genesee Valleys.

The 1980 study included Indian Creek from its mouth upstream to Antelope Dam (Figure 1). The study area was divided into five stream sections: upper Indian Creek from the dam to Flournoy Bridge; Indian Creek in the Genesee Valley area from Flournoy Bridge to Taylorsville Park; Taylorsville Park and vicinity, including the campground, picnic area, and nearby creek; Indian Creek in Indian Valley between Taylorsville Park and Arlington Bridge; and lower Indian Creek, from Arlington Bridge downstream to the mouth (Appendix I).

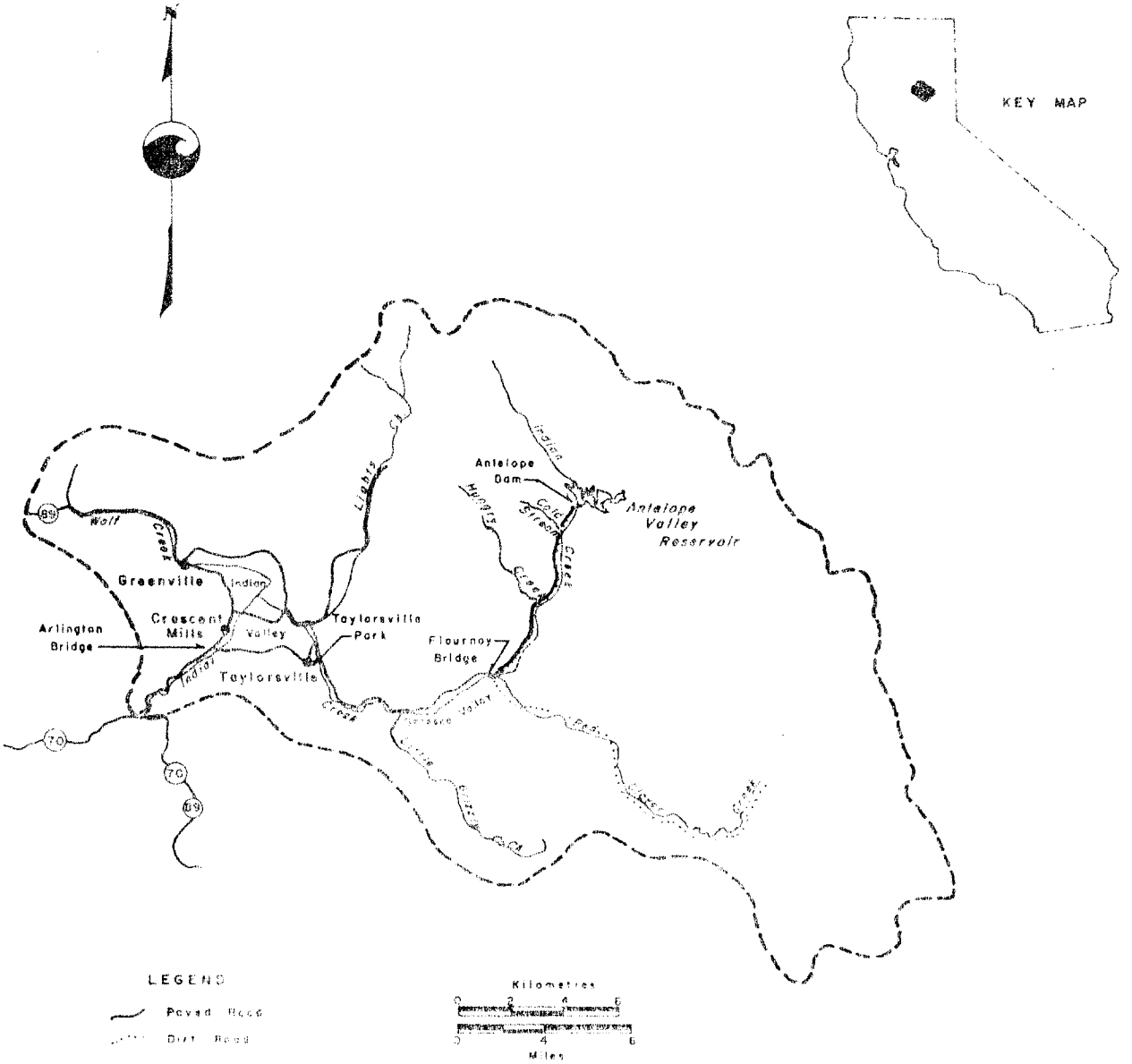
METHODS

Recreation Use Counts

Use counts were made on randomly selected dates within nine survey strata using the optimum allocation method described by Abrahamson and Tolladay (1959). Thirty-three days of the 204-day study period from April 26 through November 15, 1980, were surveyed; both days of the opening weekend of trout season, 6 of 9 holidays, 15 of 142 weekdays, and 10 of 51 weekend-days. Five one-hour counts of recreation use were made in the study area each day at regular periods, scheduled according to the number of daylight hours (Appendix II).

The surveys were made from a vehicle or on foot, as necessary, to check access and recreation sites. Recreationists (and their vehicles) were counted and recorded by recreation activity and stream section (Appendix III). The five daily counts were totalled and multiplied by factors that accounted for recreation use in the daylight periods not counted. Similarly, the resulting daily figures were expanded to estimate total recreation hours for all days in each stratum. Adding the stratum totals provided an estimate of recreation hours for the study period. To estimate total recreation days, total recreation

Figure



Indian Creek Recreation Survey and Creel Census 1980

hours were divided by the harmonic mean length of stay. The harmonic mean was used rather than the arithmetic mean to correct for the higher probability of interviewing people on lengthy visits (Lucas, 1963).

Interviews

Recreationists on Indian Creek were contacted during and between use counts. The interviewer attempted to cover a cross-section of activities on a random basis. Interviews were conducted according to density of use. When use was low, most visitors were interviewed, but during peak periods this was impossible, and only a portion of the people using the creek were contacted. The information gathered from each party included location of residence, people per vehicle, recreation activities, overnight accommodations, and length of stay (Appendix IV).

Creel Census

Anglers along Indian Creek were contacted on the 33 recreation survey days and on 24 additional days to determine fishing success. Each angler was asked for county of residence and length of time spent fishing so far that day. Fish censused were counted, measured (fork length to nearest 0.5 cm /0.2 inch/), and identified to species. Crayfish were counted but not measured. Census clerks attempted to contact as many fishermen as possible on each day, with extra effort on upper Indian Creek. Due to reduced use after mid-July, one surveyor conducted the creel census as well as use counts and interviews.

To determine total catch, the catch per hour was multiplied by estimated hours of fishing. Total weight of trout caught was estimated by computing mean weight from the mean length of censused trout (using length-weight data from Villa and Brown, 1981) and multiplying by estimated total catch.

Water Samples

Water samples were taken on 25 days at several locations on Indian Creek and later tested for pH, turbidity, and electrical conductivity. Water and air temperatures were also recorded.

RESULTS

Recreation Use

Total recreation use on Indian Creek was estimated at 75,000 recreation hours (95% confidence interval, ±10,500 hours) for the period April 26 to November 15, 1980. Total recreation hours divided by harmonic mean length of stay indicates about 42,000 recreation days of use in 1980. (A recreation hour is one hour of participation in any recreation activity by one person; a recreation day is participation by one person for all or part of a day.)

Overall, camping was the major activity observed, followed by fishing, swimming and/or beach use, and relaxing. Taylorsville Park, upper Indian Creek, and lower Indian Creek accounted for 91 percent of the total use (Table 1).

Interview Data and Visitor Characteristics

People from 779 parties were interviewed in 1980, representing 2,255 persons and 773 vehicles 1/. The mean number of people per party was 2.9, and the mean number of people per vehicle was 2.8. About 44 percent of the parties had 2 people. The mean length of day-use visits was 2.9 hours, with 30 percent of day visitors staying an hour or less. Overnight stays averaged 4.3 days, with 62 percent of overnight stays either 2 or 3 days (1 or 2 nights) (Appendix V).

The most popular recreation activity was fishing (50 percent of visitors), followed by relaxing (40 percent), camping (38 percent), picnicking (23 percent), beach use (15 percent), sightseeing (12 percent), and swimming and wading (11 percent) (Table 2). The percentages add up to more than 100 because many of the visitors participated in more than one activity.

Of the visitors interviewed, 53 percent were at Indian Creek for day use only, 28 percent stayed overnight somewhere in the general area and visited Indian Creek for day use, and 19 percent camped overnight along the creek. Fifty-four percent of the visitors came to Indian Creek as a primary destination, 19 percent were stopping on the way to someplace else, and 27 percent were staying in the general area.

1/ Two interviews of parties with large vehicles, one with 15 people and one with 53 people, were excluded from the calculations of party size in Appendix V.

TABLE 1

RECREATION HOURS BY ACTIVITY AND SURVEY AREA

Activity	Upper Indian Creek	Genesee Valley	Taylorsville Park	Indian Valley	Lower Indian Creek	Total Recreation Hours	Percent of Total
Camping	8,000	2,300	7,700	100	1,800	19,900	27
Fishing 1/	8,800	500	200	200	2,700	12,400	17
Swimming and Beach Use	400	800	3,900	100	6,400	11,600	15
Relaxing	2,600	800	3,600	100	2,400	9,500	13
Picnicking	700	400	5,500	-	300	6,900	9
Sightseeing	800	300	200	100	2,500	3,900	5
Riding	100	300	1,900	100	500	2,900	4
Gold Seeking	400	-	-	-	900	1,300	2
Walking for Pleasure	100	300	500	100	100	1,100	1
Miscellaneous/Other 2/	300	500	3,900	-	800	5,500	7
Total Recreation Hours	22,200	6,200	27,400	800	18,400	75,000	100

1/ Includes fishing for crayfish.

2/ Includes children playing outdoor games, rafting, tubing, and miscellaneous activities. Rodeo attendance at Taylorsville is not included in these figures.

TABLE 2

PERCENT OF PEOPLE PARTICIPATING
IN EACH RECREATION ACTIVITY,
FROM INTERVIEW DATA

Activity	Percent of People Participating
Fishing and Bait Gathering [1/]	50
Relaxing	40
Camping	38
Picnicking	23
Beach Use	15
Sightseeing	12
Swimming and Wading	11
Playing	6
Gold Seeking	6
Walking for Pleasure	4
Boating	2
Bicycling	1
Horseback Riding	1
Motorcycling	1
Other/Miscellaneous [2/]	4
Total [3/]	214

1/ Includes fishing for crayfish and bait gathering.

2/ Includes outdoor games, photography, gathering, hunting, and miscellaneous.

3/ Total number of people in the 779 parties interviewed was 2,255. The percentages add up to more than 100 because many people participated in more than one activity.

Forty percent of the overnight visitors to Indian Creek camped at public campgrounds or parks. Thirty-eight percent camped in undeveloped areas along the creek. Thirteen percent stayed with nearby friends or relatives, and the remainder stayed at motels, resorts, summer homes, or private campgrounds in the general area (Appendix V).

Modes of camping accommodations, in order of frequency, were: travel trailers (23 percent of overnight parties); pickup camper (21 percent); motor home, van, or bus (18 percent); tent (18 percent); sleeping out or in car (6 percent); and tent trailer (3 percent of parties). (These percentages total less than 100 because of the parties staying at motels, resorts, summer homes, or with friends or relatives.)

Thirty-five percent of the recreationists interviewed came from Plumas County, and 43 percent from the northeast counties. The next most frequent counties of origin were Butte (10 percent) and Lassen (8 percent). The several San Francisco Bay area counties accounted for 16 percent. Eight percent of the people interviewed were from out of state, mostly the Reno-Tahoe area of Nevada (Figure 2).

Creel Census Data and Angler Success

During the 1980 trout season, 1,153 anglers were contacted. They had fished 2,279 hours, with a recorded catch of 499 brown trout (Salmo trutta), 668 rainbow trout (Salmo gairdneri), and 60 other fish. Total angling use was estimated at 12,300 hours (95% confidence interval, $\pm$2,000 hours) with an estimated catch of 6,630 trout and 390 other fish (Table 3).

Eighty-seven percent of the trout were caught in upper Indian Creek, which had 71 percent of the fishing use, and by far the best fishing with a catch of 0.66 trout per hour. The average success in all areas of the creek was 0.54 trout per angler hour.

The mean length of brown trout caught during 1980 was 24.3 cm (9.6 inches) with a range of 10 to 42 cm (3.9 to 16.5 inches) (Appendix VI). The mean length of rainbow trout was 22.8 cm (9.0 inches) with a range of 9 to 42 cm (3.5 to 16.5 inches) (Appendix VII). An estimated 458 kg (1,010 pounds) of brown trout and 465 kg (1,025 pounds) of rainbow trout were caught. In addition, about 400 crayfish (Pacifastacus leniusculus) were caught in lower Indian Creek in 100 hours of fishing for crayfish.

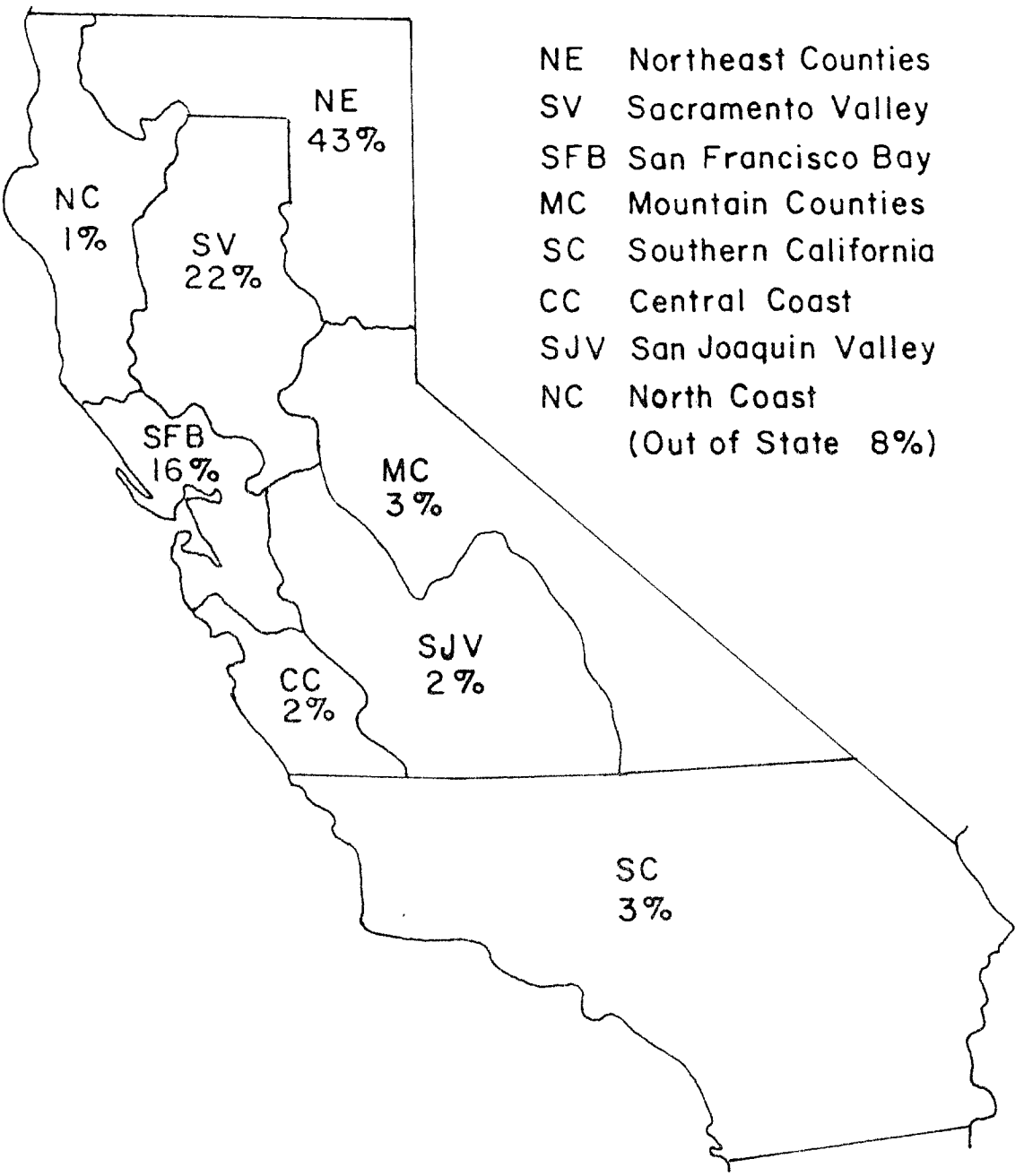


Figure 2

Indian Creek Visitor Origin by County Groups

1980

TABLE 3

SUMMARY OF ANGLER SUCCESS AND ESTIMATES
OF FISH CAUGHT BY SURVEY AREA

Survey Area	Estimated Recreation Hours Fishing	Rainbow Trout Catch Per Hour	Rainbow Trout Est. Catch	Brown Trout Catch Per Hour	Brown Trout Est. Catch	Other Fish[1/] Catch Per Hour	Other Fish[1/] Est. Catch	All Fish Catch Per Hour	All Fish Est. Catch
Upper Indian Creek	8,800	0.32	2,835	0.34	2,950	0.02	200	0.68	5,985
Genesee Valley	500	0.10	50	0	0	0.04	20	0.14	70
Taylorsville Park	200	0.05	10	0	0	0	0	0.05	10
Indian Valley	200	0.12	25	0.05	10	0	0	0.17	35
Lower Indian Creek	2,600	0.25	660	0.03	90	0.07	170	0.35	920
	12,300	0.29	3,580	0.25	3,050	0.03	390	0.57	7,020

1/ Includes 295 brown bullhead (Ictalurus nebulosus), 55 bluegill (Lepomis macrochirus), 25 golden shiner (Notemigonus crysoleucas), and 15 hitch (Lavinia exilicauda). In addition, about 400 crayfish (Pacifastacus leniusculus) were caught from lower Indian Creek in 100 hours of fishing for crayfish.

Indian Creek angler origin was similar to the origin of general recreationists determined from other interviews; 41 percent of the fishermen came from northeastern counties (Figure 3).

Streamflow, Water Quality, and Weather Data

Antelope Lake filled and began to spill on January 15, 1980. Spill increased to 6.9 m^3/s (245 ft^3/s) in late April and then gradually decreased to zero by July 10. Releases from the reservoir were maintained at 0.57 m^3/s (20 ft^3/s) the remainder of the study period except for 5 days in mid-September when the release was reduced to 0.14 m^3/s (5 ft^3/s) to permit fish population sampling (Appendix VIII).

Water quality varied by stream area and time. During the survey season, mid-day stream temperatures ranged from 6 to 20°C (43 to 68°F) in upper Indian Creek and 8 to 26°C (46 to 79°F) in lower Indian Creek. Temperatures in the Genesee Valley, at Taylorsville Park, and in Indian Valley varied between those listed above. Turbidity in the creek was relatively low during the survey. The highest recorded turbidity was 9 FTU at the mouth in April and the lowest recorded turbidity was 1 FTU at the same location in August. The pH ranged from 6.5 to 8.7 and generally indicated slightly alkaline water. Detailed water quality data are available from the Northern District, Department of Water Resources.

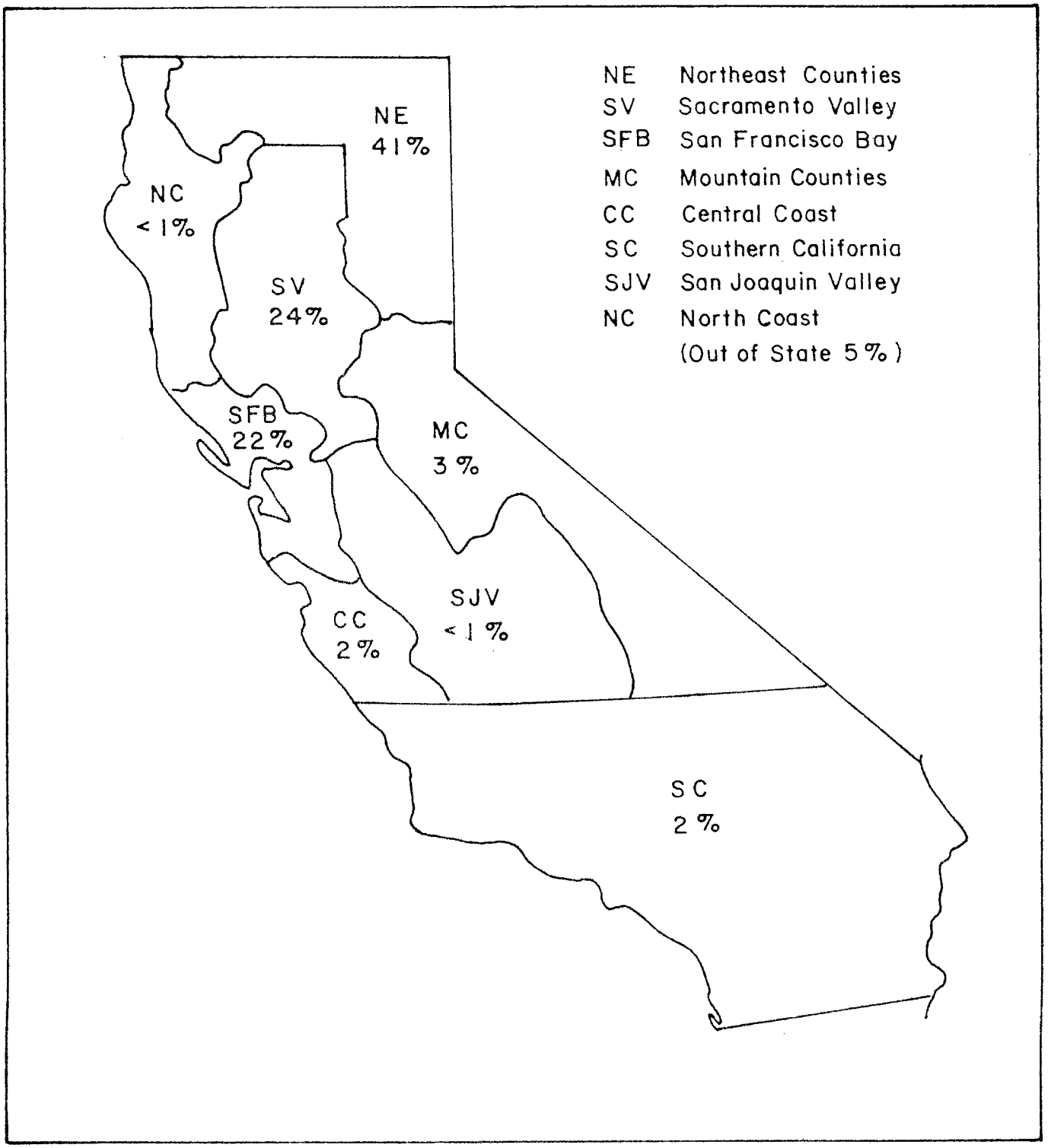


Figure 3 - Indian Creek Angler Origin by County Groups
1980

The weather during the survey was generally moderate. Daily air temperatures ranged from a low of -2°C (28°F) in November to a high of 37°C (98°F) in July. Snow fell on one day in May; there were two days of rain and several overcast days during the survey. Wind was common during the afternoons.

DISCUSSION

Understanding the limitations of the recreation use survey and interviews helps put the data obtained in perspective. This section describes constraints and compares results obtained from use counts, interviews, and the creel census. Together, the counts and interviews provide a good picture of total use and activities. The creel census data show angler success.

Limitations of Use Counts

Most recreationists on the creeks were readily observed during use counts, but accurate counts were difficult in certain areas of dense vegetation. Each survey reach except Taylorsville Park had a few such areas. The use counts may not accurately reflect certain activities such as sightseeing and walking for pleasure. These activities are better estimated by interviews.

The total recreation use estimate of 75,000 recreation hours is more accurate than the estimates for each activity, or the estimate of recreation days. The confidence interval indicates only the probable accuracy of expanding 33 days of counts to estimate use for the 204-day study period.

Vehicle access points were checked on each count, but people with some vehicles were not found. From counts of unassociated vehicles, it appears the estimate of total recreation use may be as much as 22 percent low.

On July 5-6 weekend, during the rodeo at Taylorsville, 1,426 people were present in the rodeo grounds and the county park area. Those at the rodeo were not included in the recreation hour estimates, as it was a special event unrelated to the creek. Most visitors in the vicinity were there primarily for the rodeo; however, some rodeo spectators and participants probably showed up in counts elsewhere along the creek that day.

Limitations of Interviews

Interview coverage was fair. Approximately 9 percent of the estimated number of recreationists on the creeks was interviewed. Coverage varied considerably on specific dates from 2 to 46 percent. The coverage by stratum varied from 7 to 35 percent.

Despite attempts to contact recreationists randomly, several sources of bias are possible. Bias may be introduced by conscious or unconscious selection of visitors in certain recreation activities or having certain characteristics of age, race, or sex. Another source of bias is failure to cover all access points, such as private lands and residences along the creeks. Strict sampling methods were not used to obtain randomness in interviews.

Comparison of Use Counts and Interviews

Comparison of the distribution of use counts and interviews indicates the degree to which each is representative of the underlying population. The distribution of recreationists observed and interviews are fairly close except for Taylorsville Park (Table 4). During peak use periods, it was impossible to interview recreactionists at Taylorsville Park in the same proportion as they were interviewed elsewhere. Extra interviews were made on upper Indian Creek, while long-term campers at Taylorsville Park were not interviewed repeatedly.

TABLE 4

DISTRIBUTION OF INTERVIEWS COMPARED
TO DISTRIBUTION OF ESTIMATED USED

Survey Area	Upper Indian Creek	Genesee Valley	Taylorsville Park	Indian Valley	Lower Indian Creek	Total
Percent of interviews	51	9	10	1	29	100%
Percent of recreation use (recreation hours)	30	8	36	1	25	100%

Comparison of activities reported by recreationists with what we saw them doing also indicates a fairly close correlation between the two samples (Table 5).

TABLE 5

COMPARISON OF ACTIVITY COMPOSITION
FROM INTERVIEWS AND USE COUNTS

Activity	Picnicking and Relaxing	Swimming and Beach Use	1/ Fishing	Camping	Sightseeing	2/ Riding	Misc./ Other	Total
Percent of interviews	30	12	24	18	6	1	9	100%
Percent of recreation use (recreation hours)	22	16	17	26	5	4	10	100%

1/ Including fishing for crayfish and bait-gathering
2/ Horse, bike, motorbike

The data indicate that the interviews over-represented picnicking, relaxing, and fishing and under-represented swimming, beach use, and camping. The differences are logical, due to the nature of the activities. Fishermen and people relaxing tend to be stationary and easy to interview; fishermen were also sought out for creel census purposes. Stationary people were more readily interviewed than people riding motorbikes, bicycles, or horses. Finally, campers staying several days were not interviewed repeatedly.

Limitations of Creel Census

About 19 percent of the fishing use was represented in the creel census. The distribution of anglers censused was quite close to the distribution of estimated angler use (Table 6). Anglers on upper Indian Creek were censused more often than those in other areas because the streamflow studies have focused on the upper creek. Anglers on lower Indian Creek remained for shorter periods and were more difficult to contact.

TABLE 6

DISTRIBUTION OF ANGLERS CENSUSED
COMPARED TO DISTRIBUTION OF ANGLER USE

Survey Area	Upper Indian Creek	Genesee Valley	Taylorsville Park	Indian Valley	Lower Indian Creek	Total
Percent of angler hours censused	80	4	1	1	14	100%
Percent of angler hours (from use counts)	72	4	1	1	22	100%

Comparison of 1979 and 1980 Survey Results

Overall, recreation use along Indian Creek was about 20 percent higher in 1980 than in 1979. There were variations in recreation activities and stream reaches, but total recreation use increased in all areas. Camping, beach use, and picnicking increased in most areas. However, relaxing decreased about 45 percent from 1979 figures. This apparent reduction may be partially due to different activity interpretations by the surveyors.

Fishing use in upper Indian Creek more than doubled. Fishing success (catch per hour) for brown trout was slightly lower, while success for rainbow trout tripled. Conversely, in all other areas of the creek, catch per hour of brown trout was slightly higher and success for rainbow trout was lower. These fishing success rates and the higher use caused the estimated catch of brown trout to double and the catch of rainbow trout to increase six times compared to the estimated catch in 1979. The large increase in catch of rainbow trout included an unknown number of fish washed over the spillway of Antelope Dam in spring and early summer.

Indian Creek visitor origin in 1980 was similar to the previous year. However, the length of stay for both day and overnight visitors increased slightly. Apparently, because of energy cost and other considerations, people traveled shorter distances for recreation and stayed longer.

ACKNOWLEDGEMENTS

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APPENDIX I

DESCRIPTION OF SURVEY REACHES

The six survey areas differ notably in characteristics of water quality, topography, vegetation, facilities available, access, and land ownership. Following is an overview of each section.

Upper Indian Creek

The first 18 km (11 miles) of creek below Antelope Dam is closely followed by a paved road with wide pullouts for convenient creek access. The creek flows through a granite canyon timbered with pine and fir. Parts of the canyon floor are meadowlike, especially at the upper ends of the reach. Elevation ranges from 1 500 m (4,900 feet) at the dam to 1 100 m (3,700 feet) at Flournoy Bridge. All but the lower 1.6 km (1 mile) of stream is within Plumas National Forest. Water releases were controlled at about 0.57 m^3/s (20 ft^3/s) during the 1980 survey following a lengthy spill during the winter and spring months. The stream remains cold in summer due to deep-water outflow from the dam and is usually slightly turbid. Numerous brown trout and a few rainbow trout comprise the fishery. Variable numbers of rainbow trout enter the creek from Antelope Lake when it spills. In 1980, large numbers of brown bullhead also entered the creek during the period of spill and were observed throughout the upper creek. Sacramento squawfish (Ptychocheilys grandis) and brown bullhead also occur in the lowermost portion, where the creek enters Genesee Valley.

Indian Creek in Genesee Valley

The creek gradient is low in the long valley from Flournoy Bridge to Taylorsville Park. Above Little Grizzly Creek, Indian Creek flows through private ranchlands closed to trespass. Below there, the creek flows through short sections of National Forest and private ownerships. Black oak, ponderosa pine, and Douglas fir predominate. The paved county road occasionally comes within sight of the creek. There are no developed recreation facilities in this reach. Important public access points are at Flournoy Bridge and a large

wooded flat approximately midway in the 18-km (11-mile) reach. A dirt road leads across the flat to the creek at secluded points. The stream is characteristically clear and cool. Summer low flows average 0.8 m^3/s (30 ft^3/s) at Flournoy Bridge and 1.1 m^3/s (40 ft^3/s) above Taylorsville. This reach has good fishing at times for rainbow trout, Sacramento squawfish, Sacramento sucker (Catostomus occidentalis), and a few brown trout.

Taylorsville Park and Campground Area

The picnic, camping, and rodeo facilities maintained by Plumas County just outside Taylorsville are the only developed recreation facilities on the creek. Indian Creek is easily accessible in the 0.4-km (0.25-mile) section adjacent to the picnic area. The campground and rodeo arena are on the other corners of a three-way intersection. Tall ponderosa pine shade the picnic area; oak, pine, and Douglas fir shelter the campground. There are seven picnic sites plus a group barbecue area, restrooms, horseshoe pits, piped water in the picnic area, and eight campsites in the campground. Rainbow trout are occasionally caught in this reach; other species common to Indian Valley are probably also present. Mill Race Ditch, the major water diversion for Indian Valley, normally removes up to 1.2 m^3/s (43 ft^3/s) from the creek about 1.6 km (1 mile) above Taylorsville. However, due to downstream water rights owned by the Pacific Gas and Electric Company, releases from storage at Antelope Reservoir remain in the creek.

Indian Creek in Indian Valley

In broad, level Indian Valley the creek flows through fenced pastures and meadows in private ownership. Most of the stream is far from any roads, but three secondary road bridges cross it. Difficult access is available at the bridges and from the road near the mouth of Lights Creek. Significant amounts of water are diverted for irrigation, some being returned to the creek before it leaves the valley. About a fourth of the 14 km (9 miles) of creek in Indian Valley have been channelized. This reach has Sacramento squawfish, Sacramento sucker, carp (Cyprinus carpio), rainbow trout, and brown trout, but fishing is generally poor.

Lower Indian Creek

The lower 11 km (7 miles) of Indian Creek drop in elevation from 1 100 m (3,500 feet) at Arlington Bridge to 900 m (3,000 feet) at the mouth. The rugged canyon is scenic and well wooded with oaks, pine, and Douglas fir. State Highway 89 follows the right bank of the creek; Western Pacific Railroad crosses the creek about 1.6 km (1 mile) below Arlington Bridge, and is high above the left bank at the mouth. Recreation access is available from pullouts and short spur roads off the highway at many points, but several sections of the creek are hidden from view. There are no developed recreation facilities. The varied stream channel offers small beaches, pools, rock outcroppings, and rapids. The water is normally somewhat turbid and foamy, which detracts from its aesthetic appeal. It becomes quite warm in summer. Average low flows below Crescent Mills are about 0.8 m^3/s (30 ft^3/s). The fishery is made up primarily of rainbow and brown trout, with some Sacramento squawfish, Sacramento sucker, carp, brown bullhead, and bluegill. Crayfish are abundant in summer. Fishing is fair in spring and fall.

APPENDIX II

1980 INDIAN CREEK RECREATION
USE COUNT SCHEDULE

Date	Daylight Hours	Use Counts Count	Use Counts Time	Creel Census Time (approx.)
April 26		1st	0630-0730	0800-1200
PST	15½	2nd	0900-1000	1400-1800
		3rd	1200-1300	
		4th	1430-1530	
		5th	1730-1830	
April 27		1st	0730-0830	0800-1200
DST	15½	2nd	1000-1100	1500-1900
		3rd	1300-1400	
		4th	1530-1630	
		5th	1830-1930	
May-August		1st	0700-0800	0900-1300
DST	16½	2nd	1000-1100	1600-2000
		3rd	1300-1400	
		4th	1600-1700	
		5th	1900-2000	
September		1st	0730-0830	0900-1300
DST	14	2nd	1000-1100	1400-1800
		3rd	1230-1330	
		4th	1500-1600	
		5th	1730-1830	
October		1st	0800-0900	0900-1300
DST	13	2nd	1000-1100	1400-1800
		3rd	1230-1330	
		4th	1500-1600	
		5th	1700-1800	
November		1st	0730-0830	0800-1200
PST	12	2nd	0930-1030	1300-1700
		3rd	1130-1230	
		4th	1330-1430	
		5th	1530-1630	

					LOCATION-REACH	
					TIME START	
					TIME FINISH	
					AIR TEMP.	
					WEATHER	
					WATER TEMP.	
					FLOW C.F.S.	
					APPEARANCE	
					KAYAKING	
					CANOEING	
					RAFTING	
					SHORE FISHING	
					CRAY FISHING	
					BEACH USE	
					SWIMMING/WADING	
					AQUATIC NATURE STUDY	
					GOLD SEEKING	
					SIGHTSEEING	
					WALKING FOR PLEASURE	
					BICYCLE RIDING	
					MOTORCYCLING/ ORV	
					HORSEBACK RIDING	
					JUST RELAXING	
					CAMPING	
					USING CAMPING facilities	
					USING PICNIC facilities	
					PICNICKING	
					PARTICIPATE IN OUTDOOR GAMES	
					ATTD.EVENT play,sports	
					CHILDREN PLAYING	
					ATTD.INTERP.PROGRAM	
					NATURE STUDY-FLORA	
					BIRDWATCHING	
					PHOTOGRAPHY/PAINTING	
					TOTALS	

SITE CHARACTERISTICS

COMMENTS

Duf. 7

California Department of Water Resources

River Use Survey

ACTIVITY DISTRIBUTION COUNT

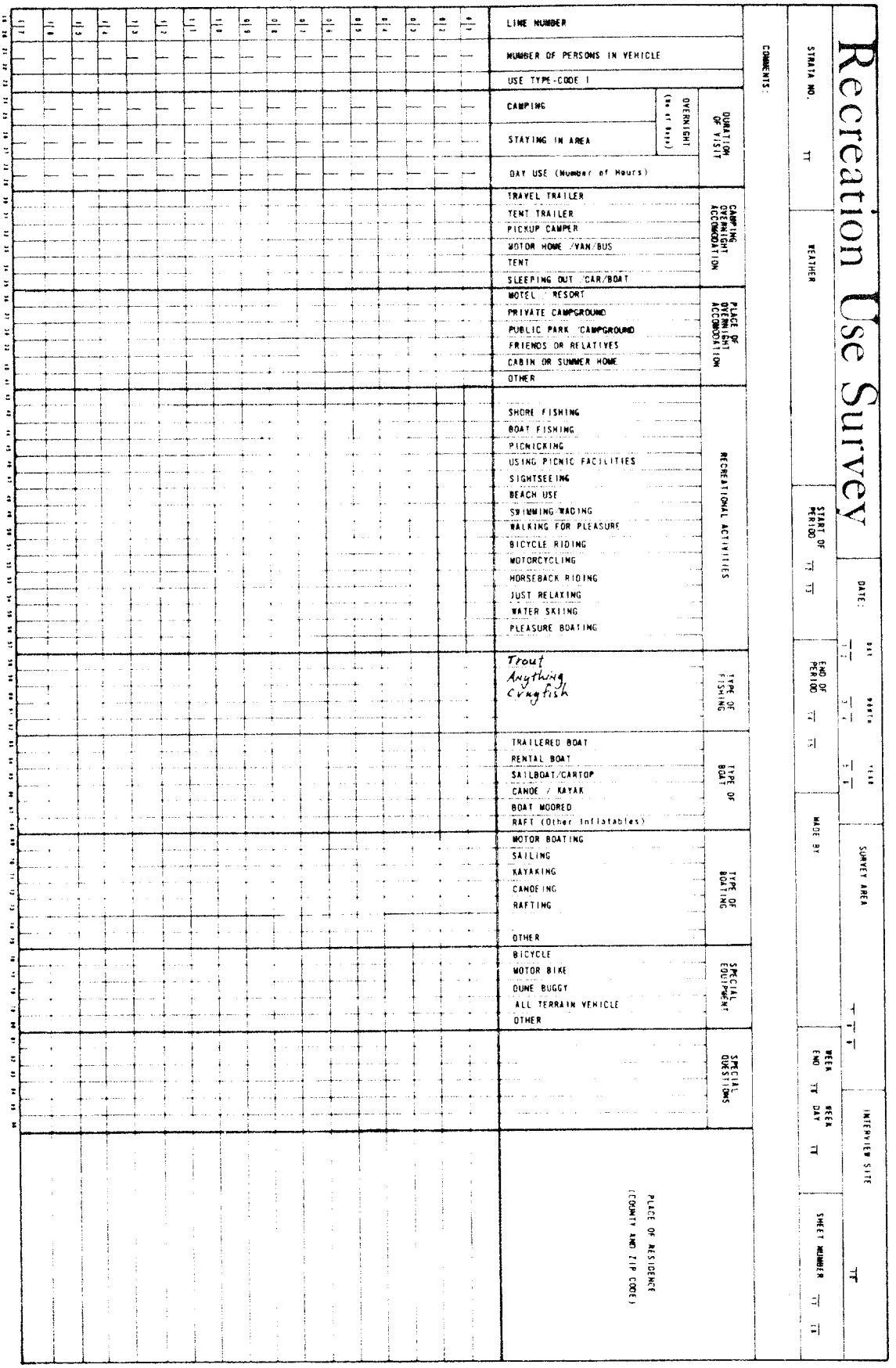
INDIAN CREEK (Plumas County)

DATE:

START NO.

MADE BY:

SHEET NUMBER



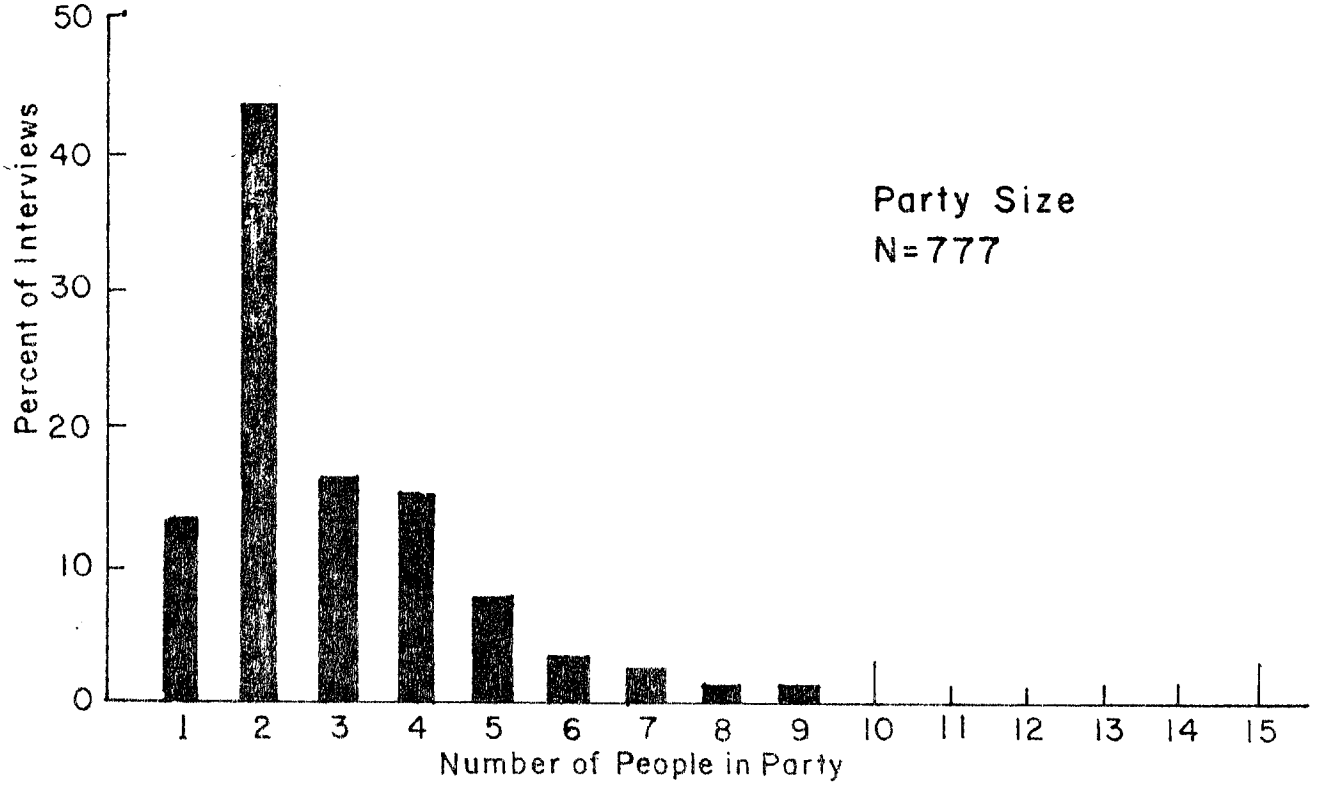
Recreation Use Survey

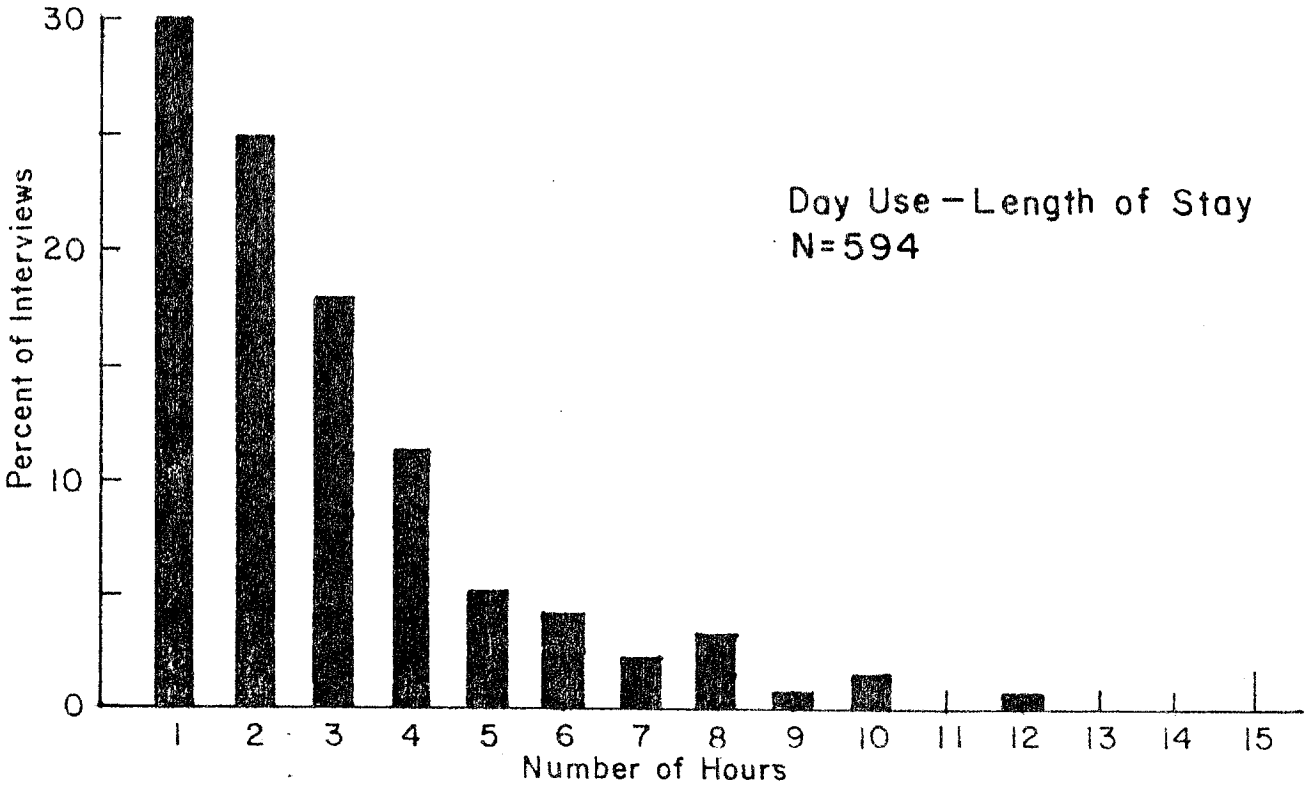
STRATA NO. 11 | WEATHER | START OF PERIOD 12 13 | DATE: DAY 14 15 MONTH 16 17 YEAR 18 19 | END OF PERIOD 20 21 | MADE BY | SURVEY AREA 22 23 24 | WEEK END 25 DAY 26 | WEEK DAY 27 | INTERVIEW SITE | SHEET NUMBER 28 29 | OF 30

COMMENTS:

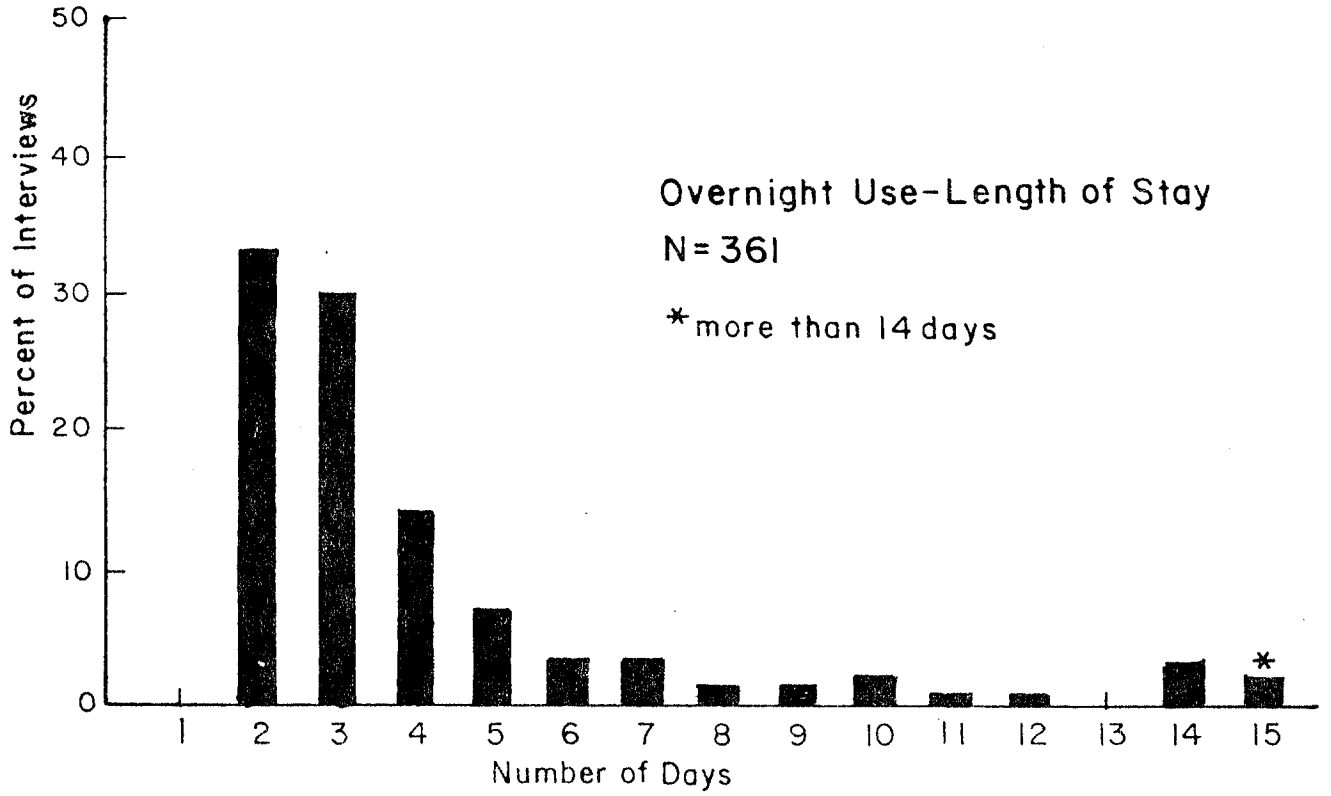
LINE NUMBER	
NUMBER OF PERSONS IN VEHICLE	
USE TYPE-CODE 1	
DURATION OF VISIT: CAMPING (OVERNIGHT (No. of Days))	
DURATION OF VISIT: STAYING IN AREA (OVERNIGHT (No. of Days))	
DURATION OF VISIT: DAY USE (Number of Hours)	
CAMPING OVERNIGHT ACCOMMODATION: TRAVEL TRAILER	
CAMPING OVERNIGHT ACCOMMODATION: TENT TRAILER	
CAMPING OVERNIGHT ACCOMMODATION: PICKUP CAMPER	
CAMPING OVERNIGHT ACCOMMODATION: MOTOR HOME /VAN/BUS	
CAMPING OVERNIGHT ACCOMMODATION: TENT	
CAMPING OVERNIGHT ACCOMMODATION: SLEEPING OUT CAR/BOAT	
PLACE OF OVERNIGHT ACCOMMODATION: MOTEL RESORT	
PLACE OF OVERNIGHT ACCOMMODATION: PRIVATE CAMPGROUND	
PLACE OF OVERNIGHT ACCOMMODATION: PUBLIC PARK CAMPGROUND	
PLACE OF OVERNIGHT ACCOMMODATION: FRIENDS OR RELATIVES	
PLACE OF OVERNIGHT ACCOMMODATION: CABIN OR SUMMER HOME	
PLACE OF OVERNIGHT ACCOMMODATION: OTHER	
RECREATIONAL ACTIVITIES: SHORE FISHING	
RECREATIONAL ACTIVITIES: BOAT FISHING	
RECREATIONAL ACTIVITIES: PICNICKING	
RECREATIONAL ACTIVITIES: USING PICNIC FACILITIES	
RECREATIONAL ACTIVITIES: SIGHTSEEING	
RECREATIONAL ACTIVITIES: BEACH USE	
RECREATIONAL ACTIVITIES: SWIMMING WADING	
RECREATIONAL ACTIVITIES: WALKING FOR PLEASURE	
RECREATIONAL ACTIVITIES: BICYCLE RIDING	
RECREATIONAL ACTIVITIES: MOTORCYCLING	
RECREATIONAL ACTIVITIES: HORSEBACK RIDING	
RECREATIONAL ACTIVITIES: JUST RELAXING	
RECREATIONAL ACTIVITIES: WATER SKIING	
RECREATIONAL ACTIVITIES: PLEASURE BOATING	
TYPE OF FISHING	Trout Anything Crayfish
TYPE OF BOAT: TRAILERED BOAT	
TYPE OF BOAT: RENTAL BOAT	
TYPE OF BOAT: SAILBOAT/CARTOP	
TYPE OF BOAT: CANOE / KAYAK	
TYPE OF BOAT: BOAT MOORED	
TYPE OF BOAT: RAFT (Other Inflatables)	
TYPE OF BOATING: MOTOR BOATING	
TYPE OF BOATING: SAILING	
TYPE OF BOATING: KAYAKING	
TYPE OF BOATING: CANOEING	
TYPE OF BOATING: RAFTING	
TYPE OF BOATING: OTHER	
SPECIAL EQUIPMENT: BICYCLE	
SPECIAL EQUIPMENT: MOTOR BIKE	
SPECIAL EQUIPMENT: DUNE BUGGY	
SPECIAL EQUIPMENT: ALL TERRAIN VEHICLE	
SPECIAL EQUIPMENT: OTHER	
SPECIAL QUESTIONS	
PLACE OF RESIDENCE (COUNTY AND ZIP CODE)	

Appendix V
Visitor Characteristics–Indian Creek, 1980





Appendix V (continued)
Visitor Characteristics–Indian Creek, 1980



PLACE OF OVERNIGHT ACCOMMODATION

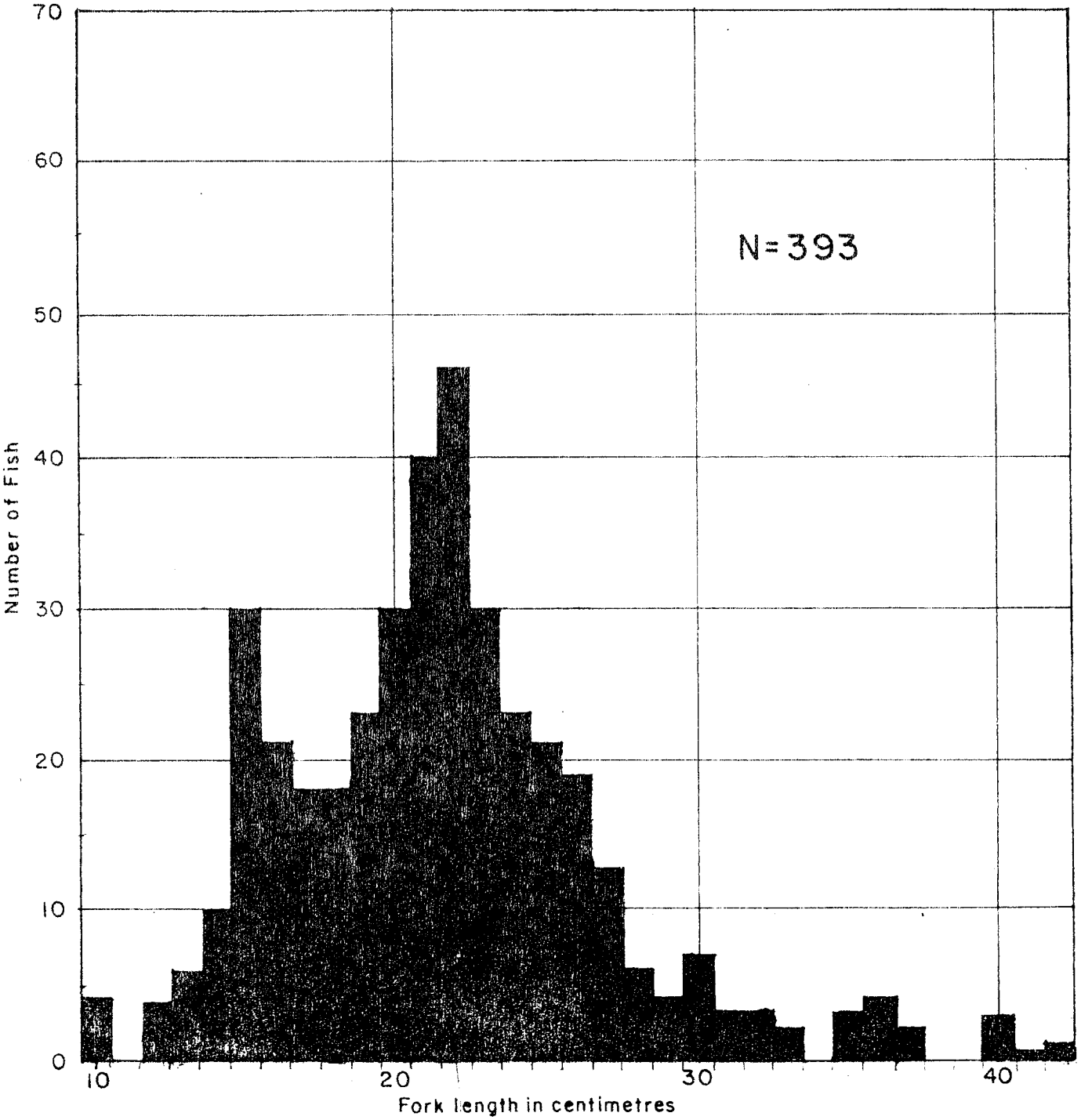
Type of Place	Percent of Interviews
Public Campground/Park	40
Undeveloped Area	38
Friends or Relatives	13
Motel/Resort	4
Cabin or Summer Home	3
Private Campground	2

CAMPING ACCOMMODATION

Type of Accommodation	Percent of Interviews
Travel Trailer	23
Pickup Camper	21
Motorhome/Van/Bus	18
Tent	18
Sleeping Out/Car/Boat	6
Tent Trailer	3

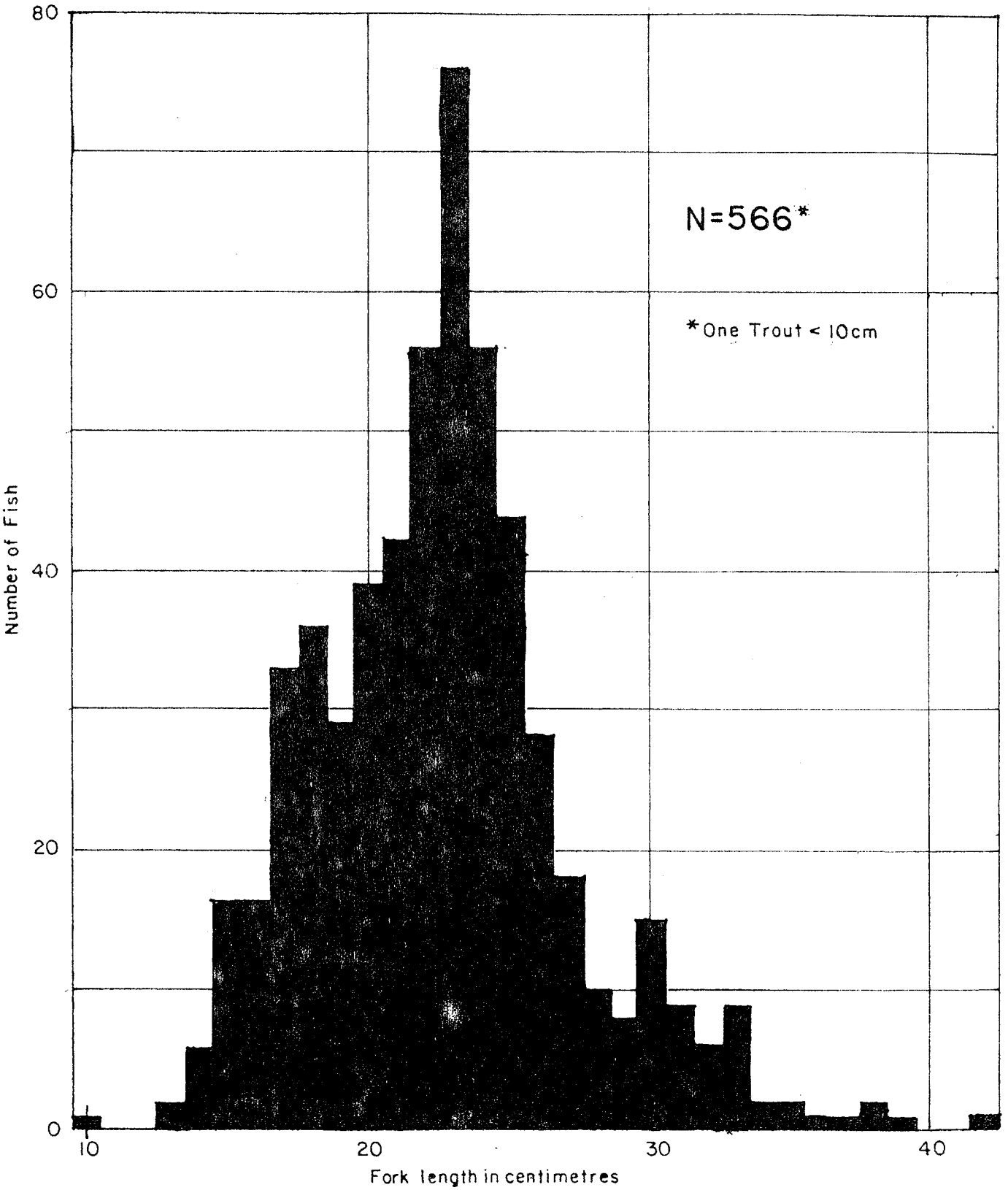
Appendix VI

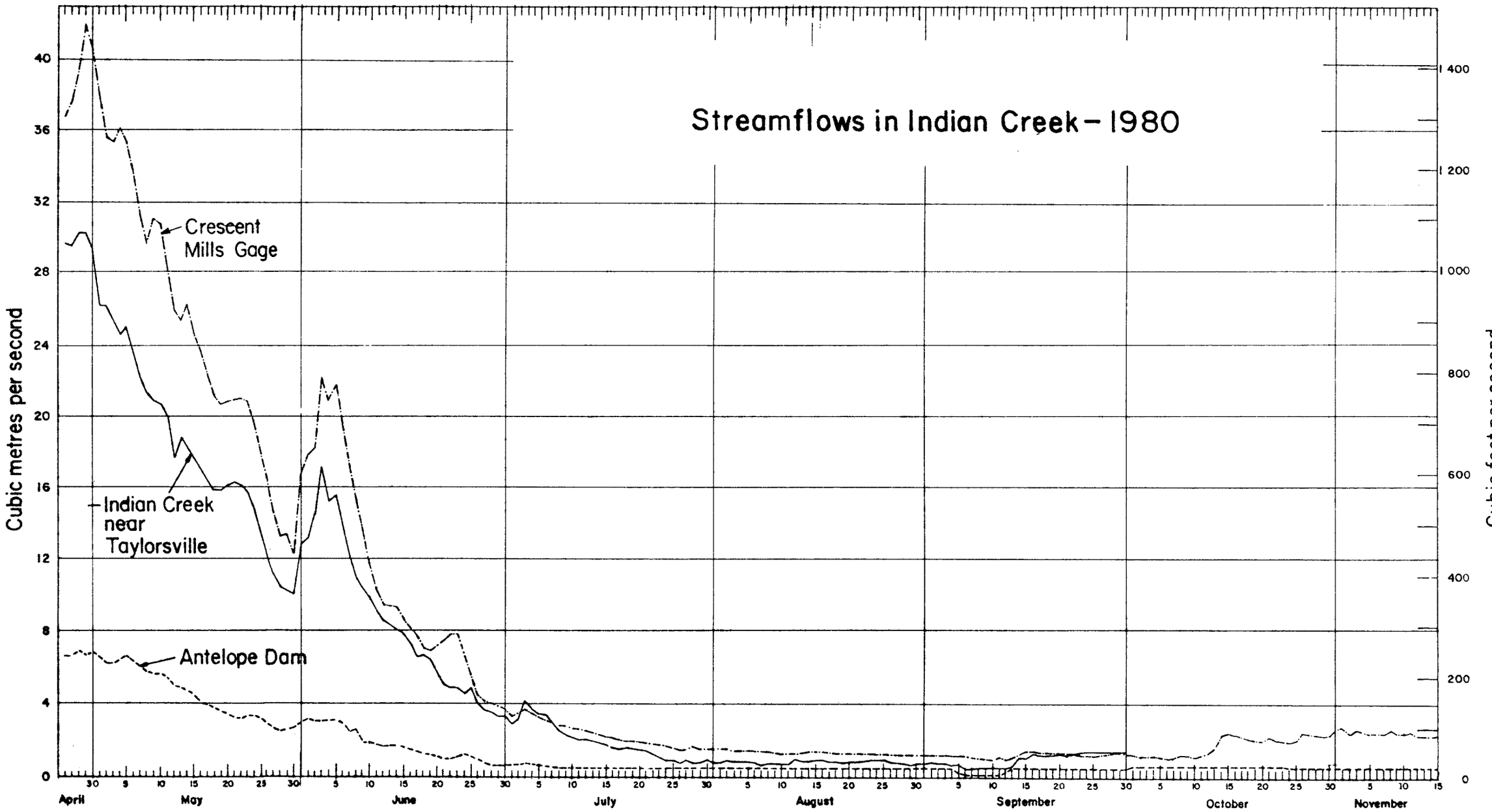
Length and Frequency of Censused Brown Trout
Indian Creek, 1980



Appendix VII

Length and Frequency of Censused Rainbow Trout
Indian Creek, 1980




Streamflows in Indian Creek – 1980
Cubic metres per second
Cubic feet per second
Crescent Mills Gage
Indian Creek near Taylorsville
Antelope Dam
0
4
8
12
16
20
24
28
32
36
40
0
200
400
600
800
1 000
1 200
1 400
April
May
June
July
August
September
October
November